TITLE OF THE INVENTION

Buoyant Hand Tool

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Patent Application Serial No. 10/336,051 filed January 3, 2003.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable

INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

Not applicable

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to hand tool construction, and more particularly to lightweight non-conductive corrosion-resistant hand tools having water buoyant characteristics for use by fishermen and boaters and others using such tools in the vicinity of water and/or electricity.

Description of Related Art

Boaters and fishermen and others who use hand tools in the vicinity of water are notorious for dropping hand tools irretrievably into the water. If the tool happens to be fabricated of metallic material, magnets may be used at the end of a long flexible line to afford some chance of retrieval. Additionally, use of metallic hand tools around salt water will quickly cause substantial, detrimental corrosion in the form of surface rust on such hand tools.

A broader concern for users of such hand tools is with respect to the presence of water on the ground or floor surface or carelessness while using a conductive hand tool around sources of electric power and energized wiring and connectors therefor.

To address the issue of buoyancy in water, Kreitz teaches a set of floating pliers in U.S. Patent 4,185,523 wherein a block of closed cell polymeric foam is inserted between the handle portions of the lever members to provide sufficient flotation to render the pliers buoyant and also to provide a resilient automatic jaw opening mechanism during use.

In U.S. Patent 5,865,077, Moffitt discloses floating, non-conductive hand tools in the form of pliers or channel locks which utilize non-conductive lever members pivotally connected together. Water buoyancy is achieved either by entrapping gas or air within a sealed airtight hollow cavity formed within the handle portion of each lever member by special manufacturing methods and apparatus and/or by providing a closed-bottomed sheathing material having a low density substantially below that of water fitted over the end of the handle portion of each lever member. A further enhancement of that disclosure by Moffitt is shown in U.S. Patent 6,202,518 which additionally teaches wear resistant removable jaw members and a line cutter interconnected to one of the handle portions of one lever member thereof.

Pliers made from a plastic material are disclosed in U.S. Patent 4,023,450 invented by Ygfors whose basic object is to produce pliers suitable for picking up small objects.

The present invention discloses light weight non-conductive, substantially non-corrosive water buoyant hand tools which achieves water buoyancy through the cooperative effects of an elongated low density sleeve open at each end thereof and

fitted over the handle portions of each lever member to sealingly enclose one or more open air cavities formed in outwardly opening fashion into each handle portion.

BRIEF SUMMARY OF THE INVENTION

This invention is directed to non-conductive substantially buoyant-in-water hand tools comprising a non-conductive handle portion and a working tool portion, the handle portion being formed of material having a density greater than water. The handle portion has one or more outwardly opening cavities formed into a side surface of the handle portion. An elongated tubular sheath covers and sealingly encloses the cavities of each handle portion whereby the effective density of each hand tool to less than that of water.

It is therefore an object of this invention to provide a lightweight non-conductive hand tool having buoyancy in water.

It is another object of this invention to provide substantially non-corrosive hand tools which are substantially non-corrosive and water buoyant, particularly in salt water.

Still another object of this invention is to provide non-conductive, non-corrosive hand tools which achieves buoyancy in water by the cooperative effect of outwardly opening cavities formed into the handle portion which are sealably covered by an elongated tubular sheath formed of low density foam material.

In accordance with these and other objects which will become apparent hereinafter, the instant invention will now be described with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Figure 1 is a front elevation view of one embodiment of the invention.

Figure 2 is a side elevation view of Figure 1.

Figure 3 is a perspective view of the invention shown in Figure 1.

Figure 4 is another perspective view of the invention shown in Figure 1.

Figure 5 is a front elevation view of another embodiment of the invention.

Figure 6 is a side elevation view of Figure 5.

Figure 7 is a perspective view of the invention of Figure 5.

Figure 8 is another perspective view of the invention of Figure 5.

Figure 9 is a front elevation view of still another embodiment of the invention.

Figure 10 is a side elevation view of Figure 9.

Figure 11 is a perspective view of the invention of Figure 9.

Figure 12 is another perspective view of the invention of Figure 9.

Figure 13 is an enlarged view of the central pivot portion and jaw portion in a closed position thereof of the invention of Figure 1.

Figure 14 is a view similar to that of Figure 13 showing the jaw portions in a partially opened position.

Figure 15 is a view similar to Figure 14 showing the jaws in a fully opened position.

Figure 16 is a perspective view of the jaw portion and central pivot portion of one of the lever members of Figure 1.

Figure 17 is a perspective view of the jaw and central portion of the other lever member of Figure 1.

Figure 18 is a view of the invention as shown in Figure 5 with added hidden detail thereof particularly with respect to the handle portions.

Figure 19 is an enlarged section view in the direction of arrows 19-19 in Figure 18.

Figure 20 is a perspective exploded view of the invention as shown in Figure 5.

Figure 21 is an enlarged section view in the direction of arrows 21-21 in Figure 13.

Figure 22 is an enlargement of area 22 in Figure 21.

Figure 23 is a section view in the direction of arrows 23-23 in Figure 14.

Figure 24 is an enlargement of area 24 in Figure 23.

Figure 25 is a perspective view of yet another embodiment of the invention in the form of a single-handled hand tool.

Figure 26 is an exploded view of Figure 25.

Figure 27 is an exploded view of a filet knife embodiment of the invention.

Figure 28 is an enlarged view of the assembled handle portion of Figure 27.

Figure 29 broken is a perspective view of a fish gaff embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, and particularly to Figures 1 to 4, one embodiment of the invention is there shown generally at numeral **10**. This embodiment **10** is in the form of a pair of pliers having elongated handle portions **28** and **30** and shorter jaw portions **18** and **20**, each forming respective end portions of lever members **12** and **14**, respectively.

The two lever members **12** and **14** are pivotally connected together at their central overlapping portions about a pivotal axis **15**. A retaining cap **16**, described herebelow secures the two lever members **12** and **14** together. These components are formed of molded plastic or fiberglass material generally, and are preferably formed of a 43% glass fiber reinforced NYLON produced by Polyplastics Celanese, Nylon PA-66, Material No. 1603-2 having a relatively low density of 1.47 g/cc. The mating facing surfaces **22** of each of the jaw portions **18** and **20**, respectively, are serrated or grooved for enhanced

gripping of objects therebetween when the handle portions **28** and **30** are first opened, then placed around an object and then squeezed for retention within the jaw portions **18** and **20** in a well-known manner.

A cutting blade **24** is secured within jaw portion **18** which is aligned with and generally bears against the mating flat facing surface **26** of jaw portion **20** to effect cutting of material objects in a conventional manner.

Each of the handle portions **28** and **30** are substantially covered by tubular low-density sleeves **32** and **34**. Each of these sleeves **32** and **34** are formed of ethylene vinyl acetate (EVA) having a wall thickness of approximately .12" and a density of approximately 0.12 g/cc. This foam material is of a closed cell design for air tightness and lightweight characteristics.

Each of the handle portions **28** and **30** include stops or flanges **46** and **48** which limit the longitudinal movement of the sheaths **32** and **34** when installed over the handle portions **28** and **30** and also include enlarged flanges **40** and **42** which are accurately positioned adjacent the distal ends **36** and **38** and accurately spaced from flanges **46** and **48**, respectively, so as to prevent off movement of the sheaths **32** and **34** during use. A lanyard aperture **44** is provided in one of the distal ends **36**. By this arrangement, once each of the sheaths **32** and **34** are slidably installed onto the handle portions **28** and **30**, respectively, the flanges **46**, **48**, **40** and **42** prevent any further longitudinal movement along the handle portions **28** and **30**.

Another embodiment of the invention is shown generally at numeral **50** in Figures 5 to 8. This embodiment **50** is of a shorter, stubbier nature in proportion; however, construction is very similar to that above described in Figures 1 to 4. Each of the lever

members **52** and **54** include jaw portions **58** and **60** which come together at mating serrated surfaces **62** for gripping objects therebetween. A cutting blade **64** bearing against flat surface **66** functions as previously described to cut objects. Pivotal engagement about the central pivot axis **55** is secured by retaining cap **56**.

Foam low-density sheaths **72** and **74** have been slidably engaged over the handle portions **68** and **70** of each corresponding lever member **52** and **54**, respectively. Flanges **80**, **82**, **140** and **142** prevent axial or longitudinal movement of each of the foam sheaths **72** and **74** during use.

The material selections used to mold each of the lever members **52** and **54** is as above described while the foam sheaths **72** and **64** are similarly constructed as shown and described in Figures 1 to 4. The distal end portions **76** and **78** are somewhat semi-spherical in configuration and include a lanyard aperture **84** formed into one distal portion **76** for convenient carrying.

In Figures 9 to 12, still another embodiment of the invention is there shown generally at numeral **80**. This embodiment is also of a shorter, stubbier nature in proportion and includes arcuately curved jaw portions **88** and **90** and shorter, stubbier handle portions **98** and **100** of each of the lever members **82** and **84**, respectively. The lever members **82** and **84** are pivotally connected at their central overlapping portions about a pivotal axis **85** and secured together by a retaining cap **86**. Jaw portions **88** and **90** include serrated mating surfaces **92** and cutting edge **96** bearing against flat surface **94** as previously described. Foam low-density sheaths **102** and **104** have been slidably engaged over each of the handle portions **98** and **100** and are maintained from further axial movement during use by flanges **110**, **112**, **111** and **113**. These sheaths **102** and

104 are formed of the above described foam material as with respect to Figures 1 to 4, as are the lever members **82** and **84**. A lanyard aperture **114** in one of the two distal end portions **106** and **108** of the handle portions **98** and **100**, respectively provides carrying facility.

BUOYANCY IN WATER

One of the most important features of the invention, that being buoyancy in water, is achieved as shown in Figures 18 to 20. The essence of the buoyancy of this invention is achieved through the combination of very light weight low density closed-cell foam material selected in the manufacture of each of the sheaths **72** and **74**, in combination with the overall size and dimensions thereof and a series of one or more properly sized cavities **34** and **36** which are formed into the side surfaces of each of the handle portions **68** and **70**.

As each of these sheaths **72** and **74** are assembled onto the handle portions **68** and **70** between flanges **80**, **82**, **140** and **142**, each of cavities **134** and **136** are automatically sealed closed as best seen in Figure 19. These cavities **134** and **136** are formed in open fashion into the side surfaces of each of the handle portions **68** and **70** such that, when the tightly fitting sheaths **72** and **74** formed of somewhat elastic material are slidably assembled onto the handle portions **68** and **70**, the airtight sealing of these cavities **134** and **136** is achieved. Note additionally that the size of each of these cavities **134** and **136** is effectively enlarged outwardly due to the fact that the actuate configuration of the inner surface of the foam sleeves **72** and **74** extends outwardly from the open perimeter of the cavity **134** and **136**.

Note further that, in the preferred embodiment shown, a plurality of cavities **134** and **136** are formed into the side surfaces in opposing inward directions of each of the handle portions **68** and **70**. Thus, as best seen in Figure 19, a somewhat "H"-shaped section is produced with sufficient plastic material utilized to form the web or central part of the "H"-shaped section of handle portions **68** and **70** for further increased depth of each of these cavities **134** and **136** toward the central plane of each of the handles **68** and **70** if desired for added buoyancy

Moreover, by providing multiple cavities **134** and **136** extending in end-to-end fashion on either side surface of each of the handle portions **68** and **70**, should one of the sheaths **72** or **74** be punctured or cut to the extent that water is allowed to enter into and flood one or more of the cavities, only a small portion of the buoyancy of the pliers **50** results from such a breach of air-tight status.

An example utilizing the embodiment of the invention shown in Figures 5 to 8 is here provided. The pair of pliers **50**, having an overall length of 6½", has the following additional physical characteristics:

Total weight of plastic material: (3 pcs.): 59.95 g.

Total volume of plastic (3 pcs.): 39.43 cc.

Total weight of foam sheaths (2 pcs): 3.19 g.

Total volume of foam sheaths (2 pcs): 26.62 cc.

Total volume of trapped air within the cavities **134** and **136** collectively: (16 cavities): 4.50 cc.

When formed based upon the above described plastic material having a density of 1.47 g/cc and a foam material having a density of 0.12 g/cc, the effective density of the entire assembly **50** was less than 1.0 g/cc, sufficient to establish buoyancy in water.

Although it is preferred to have approximately 16 to 20 individual cavities which become fully airtight and water impervious upon installation of the tubular sheaths onto the handle portions as above described, it should be understood that one elongated open cavity formed into one or both sides of one or both of the handle portions which has a sufficiently trapped air tight volume to establish the overall buoyancy in water of the pair of pliers in combination with the above described foam sheaths is within the scope of this invention.

RESTRICTED OPENING MOVEMENT

A second important feature of the invention is with respect to the prevention of detrimental, excess opening of the pair of pliers to facilitate grasping and squeezing an object between the jaw portions which is too large for the overall strength of the lever members of the device. This aspect of the invention is seen in Figures 13 to 16 and 21 to 24. In the preferred embodiment of this aspect of the invention, two features related to the opening movement of each of the lever members **12** and **14**, from the closed position as shown in Figure 13, to the partially open position shown in Figure 14 to the fully opened position shown in Figure 15, are provided. These features include both a resistive "felt" detent advising the user that the maximum limit of opening of the jaw portions **18** and **20** as seen in Figure 14 in the direction of arrow **A**, has been achieved. Thereafter, as the user approaches a maximum opening limit in the direction of arrow **B** in Figure 15, a positive limitation from further opening movement is provided as will be described more fully herebelow.

As seen in Figure 16, one of the lever arms **14** includes within its central portion between jaw portions **20** and handle portion **30**, a central enlarged aperture **130** and two

radially outwardly positioned arcuate cavities **120** and **126**. These cavities **120** and **126** are concentric about the pivotal axis **15** defined by aperture **130**. The radial configuration of each of these arcuate cavities **120** and **126** is semi-circular in cross section as best seen in Figures 22 and 24 as described more fully herebelow.

Disposed within each of these cavities **120** and **126** are detent bumps or raised areas **122** and **128**. These detent bumps **122** and **128** may be positioned symmetrically anywhere along the arcuate length of each of these cavities **120** and **126** as desired to achieve the effect of notifying a user by feel that the maximum opening of the jaw portions **18** and **20** is being approached and should not be exceeded.

The other of the lever members **12** includes a cylindrical protruding bearing portion **132** which closely mates within the cylindrical bearing aperture **130** to achieve the desired smooth pivotal opening and closing movement of the device **10**. The enlarged retaining cap **16** lockably engages within the inner bore of pivotal bearing **132** to lockably secure the entire pivotal connection together.

Projecting from the facing surface of the central portion of lever member **12** are two semi-spherical projections **124** and **125**. When assembled as best seen in Figures 21 to 24, these spherical projections **124** and **125** ride along within the arcuate cavities **126** and **120**, respectively, in closely aligned fashion as best seen in Figure 22.

However, as the jaw portions **18** and **20** approach the preselected angular orientation **A** of the lever members **12** and **14** as shown in Figure 14, the spherical projections **124** and **125** encounter the detent bumps **126** and **120**, respectively, which are cooperatively sized to cause a degree of interference therebetween. This amount of interference is best seen in Figures 23 and 24 at **127**.

Because of the plastic material selection, although generally of a tough and durable nature, a small amount of compression and deflection will occur within this interference zone **127** whereby the lever members **12** and **14** may be opened further toward angle **B** in Figure 15, the maximum allowable opening of the jaw portions **18** and **20** whereupon the spherical projections **124** and **125** come to bear against the corresponding ends of each of the arcuate cavities **120** and **126**.

As can be seen in Figures 23 and 24, the height of each of the detent bumps **124** and **125** is preselected to be slightly less than the mating depth of each of the arcuate cavities **120** and **126** whereby the amount of interference at **127** may be regulated. Obviously, the greater the interference, the greater the detent feel which will be felt by the user as this angular orientation of the lever members **12** and **14** is encountered.

Moreover, the placement of each of these detent bumps **122** and **128** in their angular orientation about the pivotal axis **15** may also be varied. The angular opening position **A** in Figure 14 may thus easily be varied as desired to be centrally positioned as shown or more closely positioned to the maximum opening position **B** in Figure 15 so that the user has a clear felt indication that further opening of the jaw portions **18** and **20** to grasp an object too large to be dealt with by the device **10** is achieved.

Referring now to Figures 25 and 26, a single handled hand tool embodying buoyant aspects of the present invention is there shown generally at numeral **150**. This embodiment **150** of the invention is in the form of a fish hook remover or extractor. An elongated handle assembly **52** is provided which is formed of molded plastic or fiberglass material and, preferably as previously described, of 43% glass fiber reinforced NYLON having a relatively low density of 1.47 g/cc. An elongated flexible tubular sleeve **154**

formed of low density ethylene vinyl acetate (EVA) having a wall thickness of approximately 1/8" and a density of .12 g/cc covers substantially the entire length of the handle portion **156**.

The handle portion **156** includes stops or flanges **164** and **166** which are spaced apart a distance equal to the length of the sleeve **154** so as to provide end stops which eliminate any longitudinal movement of the sleeve **154** when installed onto the handle portion **156** as best seen in Figure 25.

The handle portion **156** includes an enlarged butt or distal end **162** having a lanyard hole formed therethrough and further includes an enlarged proximal end **160** for supportively receiving a fisherman's tool or work implement in the form of an elongated de-hooking shaft **168** having a U-shaped bend **170** formed at a distal end thereof for hook removal from a fish.

As previously described, buoyancy in water of this embodiment **150** is accomplished by the combination of the lighter-than-water density of the sheath **154**, in combination with a plurality of cavities **158** which are molded from either side of the handle portion **156** thereinto. The cavities **158** each have a depth which approaches a central plane or web of the handle portion **156**, laterally opening outwardly as shown in Figure 26.

These cavities **158** are formed in open fashion such that, when the tightly fitting tubular sheath **154**, formed of the above-described somewhat elastic foam material, is slidably assembled onto the handle portion **156** as shown in Figure 26, an airtight seal of each of the cavities **158** is achieved. The lighter-than-water density of the sheath **154**, in combination with the total airtight volume determined by design of the collective sealed

cavities **158**, renders this embodiment **150** buoyant, with the handle assembly **152** being the uppermost floating portion at or slightly above the surface of the water for easy retrieval.

Referring now to Figures 27 and 28, still another embodiment of the invention in the form of a floating fillet knife is there shown generally at numeral **180**. This embodiment **180** includes a handle assembly **182** formed of a handle portion **186**, the above described molded fiberglass reinforced NYLON, the handle portion **186** having an enlarged butt or distal end portion **192** and a central enlarged proximal end portion **190** for supporting a fillet knife blade **198** extending therefrom as shown.

A sleeve **184** formed of EVA foam as above described having a wall thickness of between 1/8" and ¼" and a density of approximately .12 g/cc formed of closed cell foam material for air tightness is also provided. The sleeve **184** slidably engages in the direction of the arrow in Figure 27 onto the molded handle portion **186** to abut against stops or flanges **194** and **196** to prevent longitudinal movement therebetween.

As in all previous embodiments, this embodiment **180** includes outwardly laterally extending cavities **188** formed into the handle portion **186** which are sized, in combination with the volume and density selection of the sleeve **184** which sealably closes each of the cavities **188**, to render this embodiment **180** of the invention buoyant in water.

Referring lastly to Figure 29, yet another embodiment of the invention is there shown generally at numeral **200** in the form of a fish gaff. This embodiment **200** also includes an elongated molded handle portion **206** formed of molded glass fiber reinforced NYLON having outwardly extending molded cavities **208** formed thereinto. A sheath **204** also formed of EVA as previously described and having a wall thickness of approximately

¼", and a density of approximately .12 g/cc formed of foam material of a closed cell design for air tightness and lightweight characteristics, is also provided. The sheath **204** is assembled onto the molded plastic handle portion **206** against stops or flanges **214** and **216** of collar **210** and butt end **212**, respectively. The combination of overall volume of the sealed cavities **208** filled with air when the sheath **204** is assembled and the total volume of the buoyant foam material used to form the sheath **204** collectively render this embodiment **200** buoyant in water such that the handle assembly **202** will float upwardly near or just above the surface of the water.

This embodiment **200** includes the gaff **218** having a pointed distal portion **220** for gaffing a fish. A molded protective cover **222** is held in position over the sharp distal point **220** for protection, a resilient band **214** interconnecting a collar **216** and the protective cover **222** also being provided.

Note that the working tool or implement which extends from the molded handle portion may take any useful form which is useful to a fisherman or others where buoyancy, non-conducting and non-corrosiveness features are important.

While the instant invention has been shown and described herein in what are conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein, but is to be afforded the full scope of the claims so as to embrace any and all equivalent apparatus and articles.